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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/587,333

09/08/2006

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ES/4662-217

6631

23117 7590 02/11/2009  
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EXAMINER

MACAULEY, SHERIDAN R

ART UNIT

PAPER NUMBER

1651

MAIL DATE

DELIVERY MODE

02/11/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



### **DETAILED ACTION**

A response and amendment were received and entered on August 25, 2008. All evidence and arguments have been fully considered. Claims 2-4 have been cancelled. Claims 1 and 5-10 are pending and examined on the merits in this office action.

#### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1 and 5-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 1 and its dependents are rendered indefinite by the recitation of "and optionally further purified" in the fifth line of the claim. It is unclear what this term refers to. For example, it could refer to the purification of vitamin C or the reaction mixture. It is recommended that applicant amend the phrase to recite "and optionally further purifying the" and inserting the term for the component that is purified.

#### ***Claim Rejections - 35 USC § 102***

4. Rejections under 35 USC 112 have been withdrawn due to amendment.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1 and 5-10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Yin et al. (US 4,935,359) in view of Stoddard et al. (US 6,316,231), when taken in view of Sugisawa et al. (Biosci. Biotechnol. Biochem., 2005, 69:659-662), Urbance et al.

Art Unit: 1651

(International Journal of Systematic and Evolutionary Microbiology, 2001, 51:1059-1070; cited in IDS), and NCBI (Taxonomy browser (*Ketogulonicigenium vulgare*)), and further in view of Asakura et al. (Biosci. Biotechnol. Biochem. 1999, 63:46-53). Claim 1 recites a process for the production of vitamin C from L-sorbose using a microorganism belonging to the genus *Ketogulonicigenium*, said process comprising contacting cells of said microorganism in a reaction medium containing L-sorbose and isolating the produced vitamin C from the reaction mixture. Claims 5 and 6 recite the process of claim 1 wherein the microorganism is selected from the group consisting of *Ketogulonicigenium robustum*, *Ketogulonicigenium vulgare*, and mutants thereof, specifically *K. robustum* NRRL B-21627, *K. vulgare* NRRL B-30035, *K. vulgare* NRRL B-30036, or *K. vulgare* NRRL B-30037. Claims 7 and 8 recite the process of claims 1 or 7 wherein the process is carried out at a pH of about 4.0 to about 9.0 and a temperature of about 13 to about 36 degrees C, or at a pH of about 5.0 to about 8.0 at a temperature of about 18 to about 33 degrees C, respectively. Claims 9 and 10 recite the process according to claim 1 wherein the process is carried out at an L-sorbose concentration of about 2 to about 120 mg/l, particularly about 4 to about 100 mg/l.

9. Yin teaches a process for the production of vitamin C via 2-keto-L-gulonic acid by contacting L-sorbose with the microorganism *Gluconobacter oxydans* DSM 4025 to produce 2-keto-L-gulonic (col. 5, line 54-col. 6, line 8). Yin teaches that the reaction is carried out at a pH of 5 to 8 and a temperature of about 25 to about 35 degrees C (col. 6, lines 30-32). Yin teaches that the 2-keto-L-gulonic acid may be converted to vitamin C (i.e. L-ascorbic acid) while in the reaction mixture, and the vitamin C can then be

Art Unit: 1651

purified therefrom (col. 3, lines 53-65). Sugisawa teaches that *Gluconobacter oxydans* DSM 4025 was renamed to *Ketogulonicigenium vulgare* DSM 4025 (p. 659, par. 1); thus, Yin uses the use of a strain of *Ketogulonicigenium vulgare*. Yin does not teach the use the specific bacterial strains recited in claim 6 or the use of L-sorbose as a substrate.

10. Stoddard teaches a process for the production of 2-keto-L-gulonic acid by contacting L-sorbose with the bacterial strain NRRL-21627 or mutants and variants thereof (col. 2, lines 25-36). Urbance teaches that bacterial strain NRRL-21627 was renamed to *Ketogulonigenium robustum* NRL-21627 (abstract), and NCBI teaches that *Ketogulonigenium robustum* is synonymous with *Ketogulonicigenium robustum*; thus, Stoddard teaches the use of one of the claimed microbial strains.

11. Asakura teaches a method for the production of 2-keto-L-gulonic acid from strain DSM 4025 (abstract). Asakura teaches that the enzyme involved in the production of 2-keto-L-gulonic acid converts both L-sorbose and L-sorbose into 2-keto-L-gulonic acid (abstract).

12. At the time of the invention, a process for the production of vitamin C comprising nearly all of the claimed elements was known, as taught by Yin. It was further known that 2-keto-L-gulonic acid could be produced from L-sorbose by *K. robustum* NRRL B-21627, as taught by Stoddard. One of ordinary skill in the art would have been motivated to use the bacterial strain taught by Stoddard in the method of Yin because Stoddard teaches that NRRL B-21627 produces higher yields of 2-keto-L-gulonic acid than the *Ketogulonicigenium vulgare* strain taught by Yin (col. 10-11, example 3, col. 11,

Art Unit: 1651

table 6). Further, a method for the production of 2-keto-L-gulonic acid from L-sorbose using strain DSM 4025 was known, as taught by Asakura. One of ordinary skill in the art would have been motivated to combine these teachings because the activity of the enzyme was shown to be higher when acting on L-sorbose than on L-sorbose (p. 50, table 2); one would thus have recognized that L-sorbose could replace L-sorbose in the method. Furthermore, both Yin and Stoddard discuss the use of the substrate at the claimed concentration (Stoddard uses 50-200 mg/ml (5-20%; col. 5, lines 36-38) and Yin uses 80 or 120 mg/ml (8 or 12%; col. 5, examples 1 and 2). One of ordinary skill in the art would therefore have been motivated to use L-sorbose in the claimed concentration in the combined method. One of ordinary skill in the art would have had a reasonable expectation of success in combining these references because both bacterial strains were known at the time of the invention to be useful for the production of 2-keto-L-gulonic acid under similar conditions, and because it was known in the art at the time of the invention that the same microorganism was capable of producing 2-keto-L-gulonic acid from both L-sorbose and L-sorbose, and methods for cultivating the organism under conditions for the production of 2-keto-L-gulonic acid were also known. It would therefore have been obvious to one of ordinary skill in the art to combine the teachings discussed above to arrive at the claimed invention.

13. Thus, the claimed invention as a whole was *prima facie* obvious over the combined teachings of the prior art.

***Response to Arguments***

14. Applicant's arguments filed August 25, 2008 have been fully considered but they are not persuasive. Applicant argues that the cited references do not render the claimed invention obvious because Yin is directed to the production of 2-KGA (2-keto-L-gulonic acid) rather than vitamin C using the organism recited in the claims. In response to this argument, it is noted that the claims recite a method for the production of vitamin C from a substrate using a microorganism comprising contacting the microorganism with a medium containing the substrate. This process is described by Yin. The claims further recite that the process comprises isolating the purified vitamin C from the reaction mixture. This step is also taught by Yin, who teaches that the 2-KGA may be converted to vitamin C (i.e. L-ascorbic acid) while in the reaction mixture, and the vitamin C can then be purified therefrom (col. 3, lines 53-65). Yin differs from the claims in that the reference does not teach the strains recited in claim 6 and the use of L-sorbose as the substrate. However, the use of the strains recited in claim 6 and the use of L-sorbose as the substrate in the method of Yin would have been obvious at the time of the invention for the reasons discussed in the rejection above. Therefore, the claimed invention is rendered obvious by the teachings of the prior art.

15. Applicant also argues that Sugisawa does not provide evidence of the production of vitamin C in the method of Yin because the process described in the reference is not conducted under the same reaction conditions. However, it is noted that the inherent production of vitamin C is not necessary to render the claims obvious because Yin teaches that the 2-KGA may be converted to vitamin C while in the reaction mixture,



Art Unit: 1651

and the vitamin C can then be purified therefrom. Also, although applicant argues that the reference is not valid prior art under 35 USC 102, this is not found persuasive because the reference was merely relied upon to provide evidence that *Gluconobacter oxydans* DSM 4025 was renamed to *Ketogulonicigenium vulgare* DSM 4025, not as prior art.

16. Therefore, applicant's arguments have not been found to be persuasive.

### **Conclusion**

No claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 1651

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SHERIDAN R. MACAULEY whose telephone number is (571)270-3056. The examiner can normally be reached on Mon-Thurs, 7:30AM-5:00PM EST, alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn can be reached on (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SRM

/Ruth A. Davis/  
Primary Examiner, Art Unit 1651